

# Providing Secure Land Rights at Scale

Experiences, Innovations and Lessons Learned on Implementing Fit-For-Purpose Solutions

**Stig ENEMARK, Denmark, Robin McLAREN, United Kingdom,  
and Christiaan LEMMEN, the Netherlands**

**Key words:** Land Administration, Fit-For-Purpose, Land Governance, Land Rights

## SUMMARY

Land administration systems provide a country with an infrastructure for the implementation of land policies and land management strategies in support of sustainable development. In many developed countries, these systems are well developed and they provide a kind of backbone in society in support of efficient land markets and effective land-use management. However, in most developing countries, up to 90 per cent of the land and people are outside the formal systems that serve mainly the elite.

The majority of these people outside the system are the poor and the most vulnerable. This lack of secure tenure creates significant instabilities and inequalities in society and severely limits citizens' ability to participate in social and economic development. It also undermines better land use and environmental stewardship and deters responsible private investment due to the associated land risk.

Attempts to introduce conventional (western style) land administration solutions to close the security of tenure gap have lacked success. New innovative solutions are required to build affordable, pro-poor, scalable and sustainable systems to identify the way all land is occupied and used. The Fit-For-Purpose (FFP) approach to land administration has emerged as an opportunity for developing countries in this regard. It offers a viable, practical solution to quickly and affordably provide security of tenure for all and to enable control of the use of all land.

This paper provides an insight collated from 26 articles provided for a Special Issue of the Land Journal focused on FFP Land Administration (FFPLA). One group of the articles discusses conceptual, legal and institutional issues for building FFPLA systems that provide secure tenure for all using an attainable, affordable, participatory and flexible approach. The other group of the articles focuses on case studies from about 20 countries throughout the world, providing evidence and lessons learned from the FFP implementation process. The paper ends up by presenting some key trends and recommendations for designing, implementing and maintaining FFP solutions at scale.

# Providing Secure Land Rights at Scale

Experiences, Innovations and Lessons Learned on Implementing Fit-For-Purpose Solutions

**Stig ENEMARK, Denmark, Robin McLAREN, United Kingdom  
and Christiaan LEMMEN, The Netherlands**

## 1. INTRODUCTION

The phrase “Fit-For-Purpose” (FFP) is commonly used as a quality label for any intervention or activity that is appropriate, and of a necessary standard, for its intended use. In the context of land administration, the label was chosen to indicate that this (FFP) approach is appropriate and of a necessary standard for the purpose of ... providing secure land rights at scale.

The FFP approach is therefore an endeavor to address the issue of building and sustaining land administration systems, especially in developing countries, that are basically fit-for-purpose of providing security of tenure for all, rather than blindly complying with top-end technological solutions and rigid regulations for accuracy (FIG/WB, 2014). The FFP approach is affordable by using innovative technological solutions and locally trained land officers for identifying and recording the land parcels and associated land rights. Furthermore, the mapping and recording activities can be carried out simultaneously in local/regional jurisdictions throughout the country at the same time. Countrywide projects can therefore be completed within a relative short timeframe of say 5-10 years, depending on the size and population of the country.

The FFP approach is designed to be a total, flexible solution at national scale by providing a geospatial identification of the land parcels in a participatory process, providing (eventually) legal security of the various kinds of land rights related to each parcel, and providing an institutional framework for administration, maintenance and incremental upgrading over time. The approach can, of course, also be applied in a regional or local context, but then often without providing the full legal impact and security until the captured land parcels and rights are included in the national land registry at a later stage.

Discussions so far have focused mainly on the methodology for providing the spatial framework, using a participatory approach and modern technology solutions rather than conventional field surveys. However, the more fundamental issues around providing the legal and institutional frameworks have largely been overlooked, even though these issues are the most critical from a political and societal point of view.

The newly released Land Journal Special Issue on *Fit-For-Purpose Land Administration (FFPLA) – Providing Secure Land Rights at Scale* provides a comprehensive insight into the experiences, innovations and lessons learnt over recent years. The Special Issue, as presented below, includes 26 articles from around 20 countries throughout the world. The Special Issue is available online at: [https://www.mdpi.com/journal/land/special\\_issues/FFPLA](https://www.mdpi.com/journal/land/special_issues/FFPLA)

## 2. EVOLUTION OF THE FFPLA CONCEPT

The term land administration is rooted in cadastral and land registration systems originally developed for providing information about land values, land ownership and types of land use (FIG, 1995). Historically, these systems were designed for slightly different purposes in various cultures, judicial systems and regions throughout the world. The key difference is whether the transaction alone is recorded (deeds systems) or the title itself is recorded and secured (title systems). The cultural and judicial aspects relate to whether a country is based on Roman law (deeds systems) or German or Anglo common law (title systems) (Williamson, et al. 2010, pp 59-67). This difference is also apparent in relation to the legacy of colonization.

A couple of decades ago, land administration emerged as a more generic term referred to as “the processes of determining, recording, and disseminating information about ownership, value, and use of land when implementing land management policies” (UNECE, 1996, p. 91, (Dale and McLaughlin, 1999). This focus on information is still present, but within recent years, the type and quality of information needed have changed and pushed the design of land administration systems (LAS) towards “an enabling infrastructure for implementing land policies and land management strategies in support of sustainable development” (Williamson, et al. 2010, p. 34).

LAS designed this way, enables the management of four key functions, including land tenure (securing and transferring rights in land and natural re-sources); land value (valuation and taxation of land and properties); land use (planning and control of the use of land and natural resources); and land development (implementing housing schemes, infrastructures, and construction works). These four functions ensure proper management of rights, restrictions, and responsibilities in relation to property, land use and natural resources. However, the basis or the backbone of such systems is the land tenure component related to the individual land parcel and establishing the relationship between people and land.

In most developed countries, security of tenure is taken for granted. Over centuries, these countries developed mature land institutions and laws that protect the people to land relationship and provide the services needed for supporting an efficient land market and effective land use management. However, an educated estimate indicates that for 70 per cent of the world’s population, this is not the case (McLaren, 2015). In most developing countries, people cannot register and safeguard their land rights, or it may be too costly. The majority of these people are the poor and the most vulnerable in society. Therefore, over recent years, LAS has developed to also capture and include more informal and social types of tenure. This is encouraged and supported through development of concepts such as the Continuum of Land Rights (GLTN, 2008), FIG, 2010), and aspects of Responsible Governance of Tenure (FAO, 2012, Zevenbergen et al., 2016).

The key driver behind this evolution has been the overall global agenda focusing on poverty eradication, food security, gender equity, human rights, etc., as adopted by the Millennium Development Goals (MDGs) in 2000 and followed by the Sustainable Development Goals (SDGs) in 2015. This agenda has placed a strong focus on security of land rights and provided targets and indicators for measuring the progress of achieving the goals. Another key driver is technology development that has enabled easy access to new, innovative mapping and

surveying techniques such as satellite and drone imagery, mobile phones and handheld GPS as well as techniques for storage and management of huge datasets (World Bank, 2017).

Over time, these evolutionary endeavors have been conceptualized into the FFPLA approach designed to meet the challenges of providing secure land rights at scale (Enemark, et al. 2014, Enemark, et al., 2016). The concept, as shown in Figure 1, includes three interrelated frameworks that work together to deliver the FFP approach: the spatial, legal and institutional frameworks.

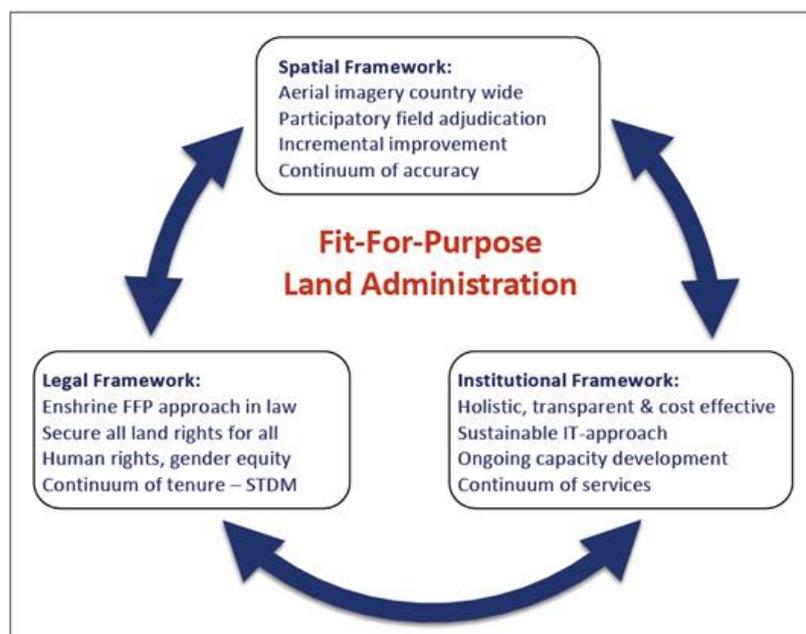


Figure 1. The FFPLA concept (Enemark et al., 2016, p. 17).

The spatial framework geospatially defines the way land is occupied and used. The scale and accuracy of this representation are not determined by rigid, high accuracy regulations, but instead by the users’ requirements for effectively identifying the land parcels as a basis for securing the various kinds of legal and legitimate rights and tenure forms recognized through the legal framework. The institutional framework and partnerships are designed to manage these rights, the use of land and natural resources and to deliver inclusive and accessible services. The approach is flexible, affordable, and participatory, and the outcome is upgradeable over time.

### 3. THE FFPLA SPECIAL ISSUE

Over recent years, the FFPLA concept has been introduced in many countries throughout the world for providing secure land rights at scale within a short timeframe and at affordable costs. Figure 2 shows the range of countries where FFPLA assessment and implementation are addressed in this Special Issue.



Figure 2. FFPLA Country assessment and implementation addressed in this special issue

This Special Issue provides an insight, collated from 26 articles, focusing on various aspects of the FFPLA concept and its application. It presents some influential and innovative trends and recommendations for designing, implementing, maintaining and further developing FFP solutions for providing secure land rights at scale. The first group of 14 articles is published in Volume One and discusses various conceptual innovations related to spatial, legal and institutional aspects of FFPLA and its wider applications within land use management. The second group of 12 articles is published in Volume Two and focuses on case studies from various countries throughout the world, providing evidence and lessons learned from the FFPLA implementation process.

### 3.1 Key Contents

The conceptual innovations (Volume One) includes issues such as:

- Assessing procedures of maintenance of conventional as well as unconventional systems;
- Assessing adjudication and quality assurance for legal and spatial data collected in the participatory processes of field work;
- Applying innovative geospatial tools to FFPLA;
- Using decentralization as a strategy for scaling FFPLA;
- Assessing the role of FFPLA for providing security of tenure in violent conflict settings;
- Applying the FFP approach to wider land management functions and to urban resilience in times of climate change and Covid-19 pandemic, and
- Exploring the role and opportunities of the private financial sector and public private partnerships within FFPLA

The overall contents of Volume One is shown in Table 1 below.

**Table 1. Conceptual Innovations**

|                       | Title   | Country focus                              | Application   |
|-----------------------|---|--|---|
| Bennett et al.        | Land Administration Maintenance: A review of the Persistent Problem and Emerging Fit-For-Purpose Solutions  | Global                                     | Methodologies of maintenance  |
| Lengoiboni et al.     | Initial Insights on Land Adjudication in a Fit-For-Purpose Land Administration  | Global                                     | Methodologies of adjudication   |
| Augustinus and Tempra | Fit-For-Purpose Land Administration in Violent Conflict Settings  | Sudan, Iraq, DRC, Honduras, Peru, Somalia, | Addressing land rights in conflict settings                                   |
| Ho et al.             | Decentralization as a Strategy to Scale Fit-for-Purpose Land Administration: An Indian Perspective on Institutional Challenges                              | India                                      | Decentralization as a FFPLA tool  |
| Mitchell et al.       | The Benefits of Fit-for-Purpose Land Administration for Urban Community Resilience in a Time of Climate Change and COVID-19 Pandemic                        | Solomon Islands                            | FFPLA in support of Improving urban resilience                                |
| Kelm et al.           | Applying the FFP Approach to Wider Land Management Functions  | Global                                     | The wider use of the FFPLA approach   |
| Childress et al.      | Fit-For-Purpose, Private-Sector Led Land Regularization and Financing of Informal Settlements in Brazil   | Brazil                                     | Applying a private sector led approach  |
| Moran et al.          | Exploring PPPs in Support of Fit-For-Purpose Land Administration: A Case Study from Côte d'Ivoire   | Ivory Coast                                | Applying a PPP in support of FFPLA  |
| Reydon et al.         | The Amazon Forest Preservation by Clarifying Property Rights and Potential Conflicts: How Experiments Using Fit-for-Purpose Can Help                        | Brazil                                     | Applying a FFP approach in support of forest preservation                     |
| Rocha et al.          | Quality Assurance for Spatial Data Collected in Fit-for-Purpose Land Administration Approaches in Colombia  | Colombia                                   | Assessing the FFPLA data quality  |
| Hall and Whittal      | Do Design Science Research and Design Thinking Processes Improve the 'Fit' of the Fit-For-Purpose Approach to Securing Land Tenure for All in South Africa? | South Africa                               | Exploring the use of design science research and design thinking within FFPLA |
| Koeva et al.          | Geospatial Tool and Geocloud Platform Innovations: A Fit-for-Purpose Land Administration Assessment   | Rwanda, Kenya, Ethiopia, and Zanzibar      | Assessing the use of geospatial tools in Africa                               |
| Chipofya et al.       | SmartSkeMap Scalable Documentation for Community and Customary Land Tenure  | Global                                     | Spatial documentation of community land tenure                                |
| Biraro et al.         | Good Practices in Updating Land Information Systems that Used Unconventional Approaches in Systematic Land Registration                                     | Global                                     | Updating practices in unconventional land registration                        |

These new innovations are making the implementation of the FFP approach more efficient and widening the use in land management applications. Overall, these conceptual innovations are making the approach more attractive for countries to implement and allows the social and economic benefits to be realized more quickly for a sustainable future.

The experiences and lessons learnt from country implementation (Volume Two) include cases such as:

- Assessing the development impacts of the processes used in China and Vietnam for providing secure land rights at scale;
- Analyzing the strategy and implementation processes for applying a FFPLA approach in Indonesia, Nepal, Uganda and Mozambique;
- Analyzing demonstrative cases of piloting a FFPLA approach and applying FFPLA tools for land recordation in Ghana, Kenya, Uganda, Zambia and Namibia;
- Analyzing the impact of applying the FFPLA approach to South Africa;
- Using a FFP approach for upscaling of land administration in Benin ;
- Applying the FFPLA approach in response to post disasters in the Caribbean; and

Page 6 of 12

---

Providing Secure Land Rights at Scale - Experiences, Innovations and Lessons Learned on Implementing Fit-For-Purpose Solutions (10956)  
Stig Enemark (Denmark), Robin McLaren (United Kingdom) and Christiaan Lemmen (Netherlands)

FIG e-Working Week 2021

Smart Surveyors for Land and Water Management - Challenges in a New Reality  
Virtually in the Netherlands, 21–25 June 2021

- Assessing FFPLA applications in Colombia and Ecuador.

The overall contents of Volume Two is shown in Table 2 below.

**Table 2. Country Implementations.**

|                   | Title  | Country focus         | Application  |
|-------------------|--|-----------------------|--|
| Byamugisha        | Experiences and Development Impacts of Securing Land Rights at Scale in Developing Countries: Case Studies of China and Vietnam                  | China, Vietnam        | Securing land rights at scale in China and Vietnam |
| Martono et al.    | The Legal Element of Fixing the Boundary for Indonesian Complete Cadastre  | Indonesia             | Applying FFPLA in Indonesia                        |
| Panday et al.     | Securing Land Rights for All through Fit-for-Purpose Land Administration Approach: The Case of Nepal   | Nepal                 | Applying FFPLA in Nepal                            |
| Musinguzi et al.  | Fit for Purpose Land Administration: Country Implementation Strategy for Addressing Uganda's Land Tenure Security Problems                       | Uganda                | Applying FFPLA in Uganda                           |
| Chigbu et al.     | Fit-for-Purpose Land Administration from Theory to Practice: Three Demonstrative Case Studies of Local Land Administration Initiatives in Africa | Ghana, Kenya, Namibia | Applying FFPLA approaches in Africa                |
| Antonio et al.    | Transforming Land Administration Practices through the Application of Fit-For-Purpose Technologies: Country Case Studies in Africa               | Uganda, Kenya, Zambia | Applying the STDm in Africa                        |
| Mekking et al.    | Fit-For-Purpose Upscaling Land Administration – A Case Study from Benin  | Benin                 | Applying FFPLA in Benin                            |
| Balas et al.      | The Fit for Purpose Land Administration Approach-Connecting People, Processes and Technology in Mozambique                                       | Mozambique            | Applying FFPLA in Mozambique                       |
| Williams-Wynn     | Applying the Fit-for-Purpose Land Administration Concept to South Africa   | South Africa          | Assessment of applying FFPLA in South Africa       |
| Griffith-Charles  | Application of FFPLA to Achieve Economically Beneficial Outcomes Post Disaster in the Caribbean  | Caribbean Islands     | Applying FFPLA in the Caribbean                    |
| Becerra et al.    | Fit-For-Purpose Applications in Colombia: Defining Land Boundary Conflicts between Indigenous Sikuani and Neighbouring Settler Farmers           | Colombia              | Applying FFPLA in Colombia                         |
| Todorovski et al. | Assessment of Land Administration in Ecuador Based on the Fit-for-Purpose approach   | Ecuador               | Assessment of applying FFPLA in Ecuador            |

This wide range of country cases clearly demonstrates that the FFPLA approach is applicable within different contexts by reflecting the specific cultural, legal and institutional settings. The pilot cases validate that the FFPLA methodology for recording land parcel rights in the field is flexible and has been proven to work effectively.

The Special Issue is also published in a book format in two volumes and freely available online.

### 3.2 Key outcome

The main motivation for this special edition was to share experiences and research into the FFPLA approach to help accelerate its implementation at scale and quickly resolve the global insecurity of tenure crisis. The articles indeed illustrate the significant progress that has been achieved over the past decade. They provide some very encouraging lessons learned, as well as exciting, innovative technologies to inspire land professionals to achieve the challenging objectives of the SDGs.

These new highlighted opportunities for going to scale include a clearer understanding of how to decentralize roles and responsibilities and manage organizational change. It also includes a better comprehension of how to obtain political support, gain consensus and formulate national FFPLA strategies, and new insights into implementing robust and the sustainable maintenance of land rights. The articles provide examples of obtaining alternative sources of financing for FFPLA through new types of PPPs, and a pioneering use of private social enterprises for embracing FFP land financing to support the regularization and upgrading of informal settlements. A range of technical innovations is presented, including greater efficiencies derived from the use of machine learning to extract information from drone imagery. Finally, and very importantly, the articles provide a rich set of experiences from FFPLA national scale implementations, as well as pilot projects from developing countries in three continents.

The articles also indicate that the impact of the FFP approach is unfolding beyond its initial focus on security of tenure. UN agencies are widely adopting FFPLA as a tool to mitigate underlying land issues in violent conflict settings, and it is being embraced in wider, urban land management functions to support housing resilience, property valuations, and mitigate the impact of climate change and pandemics. The articles confirm that the FFPLA approach is growing in acceptance across the land professional community, is gaining considerable momentum and is a game changer in achieving key elements of the global agenda, the SDGs, and the globally accepted policies and guidelines around responsible governance of tenure. The FFPLA is already triggering a change in society towards greater social equity, leaving no one behind.

#### 4. DISCUSSION AND LESSONS LEARNED

Despite this impressive progress as presented above, there are still issues to be resolved. When adopting the methodology for a national approach, which is the recommended approach, a range of potential conflicting interests may come into play, especially with regard to the protection of the current roles of land professionals and the governmental land agencies who may see this FFPLA approach as disruptive. Therefore, the process of implementation at a national scale needs to engage all stakeholders in order to address and remove any potential fears and threats towards vested interests and, thereby, create shared ownership of the benefits of wide societal adoption. In this regard it should be noticed that the FFPLA approach offers a range of opportunities for the land professionals in terms of servicing the total population and acting as custodians for managing a national infrastructure in support of social stability, economic growth and sustainable development. In this regard, attention should be drawn to a famous quote from medieval times stated by Machiavelli who has often been named the father of modern political philosophy and political science:

*“It should be borne in mind that there is nothing more difficult to plan, more doubtful of success, nor more dangerous to manage than creation of a new system. For the initiator has the enmity of all who would benefit from the preservation of the old institutions and merely lukewarm defenders in those who would benefit from the new ones”*

(Machiavelli, 1523, Ch. 6).

Therefore, even though the FFPLA concept is quite straight forward, cost effective, fast to implement, it can easily be seen as disruptive and potentially threatening to many vested interests. To overcome these barriers, requires a focus on the benefits to society to be achieved by implementing a FFPLA approach, e.g. effective engagement through seminars and open discussions with all relevant stakeholders, including civil society towards developing a national strategy for implementing.

On the other hand, the FFP approach is fully in line with the globally accepted policies, such as the SDGs and VGGTs, which implies a more fundamental and fairer change in society towards greater social equity and leaving no one behind. This will gradually reduce the divide between those who have and those who have not. Therefore, even though political support is normally hard to achieve for large scale land administration projects, the FFPLA approach is generally attractive to politicians due to the significant economic and social benefits to society and the citizens. Other political enticements are the affordable costs and the short timeframe for completing the program that can be achieved within their political election cycle.

The benefits to society of adopting the FFP approach are certainly many. The key benefit would be that, by taking this approach, it will be possible to include all land in the formal land administration system within a reasonable short time and for a relatively low cost. A FFP approach also means that the solution can be shaped to fit the size of the economy – the budgetary capacity – that the system is intended to serve. Furthermore, such a framework will be more flexible and suitable for meeting the current demands in the land sector – and the framework can easily be incrementally improved over time. This will enable a developing country to leap frog many of the steps and lessons that developed countries have been through when the time is right, resources are available, and the need for improvement present itself. Recent experience, as also unfolded in the FFPLA Special Issue, indicates that the benefits will easily outweigh any possible disadvantages.

#### **4.1 Key lessons learned**

Some key lessons learnt can be drawn from FFPLA Special Issue and the recent period of innovation and implementation:

- A range of FFPLA pilot projects in various countries have shown that the FFP approach is easy to implement and well accepted and understood by the local communities;
- FFP national projects can be completed at affordable costs (< 10 USD per parcel) and within a timeframe of a few years. This is due to the use of locally trained land officers and low-cost technology for mapping the land parcels using a participatory approach to record the connected land rights;
- Technology development is a key driver in terms of providing the relevant mapping and registration tools e.g. handheld GPS, drones, and machine learning to extract information from aerial and street level imagery;
- Innovative financing can be obtained e.g. through new types of Public- Private-Partnerships (PPP) through and private sector support for regularization and upgrading of informal settlements;

- The FFPLA approach is unfolding beyond providing security of tenure – e.g. for mitigating land issues in violent conflict settings and for wider land management functions such as valuation, urban resilience, climate change and pandemics;
- The FFPLA approach is gaining momentum and growing acceptance within the (younger) land professional community as a game changer in achieving key aspects of the global agenda, the SDGs, towards greater social equity and leaving no one behind.

## 5. CONCLUDING REMARKS

There is a clear consensus that governing the people to land relationship is at the heart of the 2030 global agenda. Therefore, there is an urgent need to build effective, simple and basic systems using a flexible and affordable approach to quickly identify the way land is occupied and used, whether these land rights are legal or locally legitimate. The systems need to be simple and flexible in terms of spatial identification, legal regulations and institutional arrangements in order to meet the actual needs in society today with the capability to be incrementally improved over time, when required. Building such spatial, legal, and institutional frameworks will establish the link and trust between people and land. This is now possible due to emerging, game changing technology developments that enable mapping and registration procedures to be undertaken in much simpler, cost efficient and participatory ways. In turn, this will enable the management and monitoring of improvements in meeting aims and objectives of adopted land policies as well as effectively meeting the global agenda.

The results of the current country implementations of FFPLA happening and expanding worldwide will make this approach compelling and widely adopted. At last, there will be a scalable land administration solution implemented across the globe to eliminate the scourge of insecurity of tenure. All land professionals need to embrace and fully support this approach.

## REFERENCES

- Dale, P.; McLaughlin, J. (1999): Land Administration; Oxford University Press, UK
- Enemark, S.; Bell, K.; McLaren, R.; Lemmen, C. (2014): Fit-For-Purpose Land Administration; FIG Publication No. 60: Copenhagen, Denmark. <http://www.fig.net/resources/publications/figpub/pub60/figpub60.pdf>
- Enemark, S.; McLaren, R.; Lemmen, C. (2016): Fit-For-Purpose Land Administration—Guiding Principles for Country Implementation; GLTN; UN-Habitat: Nairobi, Kenya. <https://gltm.net/download/fit-for-purpose-land-administration-guiding-principles-for-country-implementation/>
- FAO (2012): Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of Food Security; Rome, Italy. <http://www.fao.org/tenure/voluntary-guidelines/en/>
- FIG (1995): The FIG Statement on the Cadastre; FIG Publication No. 11: Copenhagen, Denmark. <https://www.fig.net/resources/publications/figpub/pub11/figpub11.asp>
- FIG/GLTN (2010): The Social Tenure Domain Model; FIG Publication No. 52. Copenhagen. <https://www.fig.net/resources/publications/figpub/pub52/figpub52.asp>
- GLTN (2008): Secure Land Rights for All; UN-Habitat: Nairobi, Kenya.

<https://unhabitat.org/books/secure-land-rights-for-all/>

Machiavelli, N. (1513): The Prince, Florence, Italy.

McLaren, R. (2015): How Big Is Global Insecurity of Tenure? GIM International: The Netherlands. <https://www.gim-international.com/content/article/how-big-is-global-insecurity-of-tenure>

UNECE (1996): Land Administration Guidelines: With Special Reference to Countries in Transition; UNECE: Geneva, Switzerland; New York, NY, USA.

<https://unece.org/DAM/hlm/documents/Publications/land.administration.guidelines.e.pdf>

Williamson, I.; Enemark, S.; Wallace, J.; Rajabifard, A. (2010): Land Administration for Sustainable Development; ESRI Academic Press: Redlands, CA, USA.

World Bank (2017): New Technology and Emerging Trends: The State of Play for Land Administration; World Bank: Washington, DC, USA, 2017.

Zevenbergen, J.; De Vries, W.; Bennett, R. (Eds.) (2016): Advances in Responsible Land Administration; CRC Press: Boca Raton, FL, USA.

## BIOGRAPHICAL NOTES



**Stig Enemark** is Honorary President of the International Federation of Surveyors, FIG (President 2007-2010). He is Professor Emeritus of Land Management at Aalborg University, Denmark and is now acting as an international consultant in land administration and capacity development.

Email: [enemark@land.aau.dk](mailto:enemark@land.aau.dk)

Web: <http://personprofil.aau.dk/100037?lang=en>



**Robin McLaren** is director of the independent consulting company Know Edge Ltd, UK. He has supported many national governments in formulating land reform and National Spatial Data Infrastructure (NSDI) strategies.

Email: [robin.mclaren@KnowEdge.com](mailto:robin.mclaren@KnowEdge.com)

Web: [www.KnowEdge.com](http://www.KnowEdge.com)



**Christiaan Lemmen** is Professor of Land Administration modelling at University of Twente, The Netherlands. He is also geodetic advisor with Kadaster International, the International Branch of the Netherlands Cadaster, Land Registry and Mapping Agency.

Email: [Chrit.Lemmen@kadaster.nl](mailto:Chrit.Lemmen@kadaster.nl)

Web: <https://research.utwente.nl/en/persons/christiaan-chrit-lemmen>